

CHEM2110 ASSIGNMENT

Stoichiometry

QUESTION 1

The hydrated salt $\text{Al}_2(\text{SO}_4)_3 \cdot n\text{H}_2\text{O}$ is 8.097% by mass of aluminium.

Calculate the value of n .

QUESTION 2

There are two isotopes of chlorine. One of these isotopes is chlorine-35 with an atomic mass of 34.93 amu and a natural abundance of 75.53%.

Calculate the atomic mass of the other isotope of chlorine and write the symbol of this isotope.

QUESTION 3

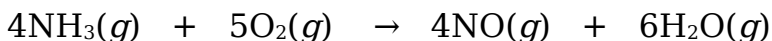
A certain compound contains only carbon, hydrogen and bromine. Complete combustion of 25.50 mg of this compound produces 3.216 mg of water.

A 0.8492-g sample of this compound contains 6.263×10^{21} atoms of carbon.

Determine the empirical formula of this compound.

QUESTION 4

(a) Consider the reaction represented by the following chemical equation:



A student reacted $\text{O}_2(g)$ with an excess amount of $\text{NH}_3(g)$.

The actual yield of $\text{NO}(g)$ was 0.9618 g and the percentage yield of $\text{NO}(g)$ was 85.51%.

Calculate the mass of $\text{O}_2(g)$ that was reacted with $\text{NH}_3(g)$.

(b) $\text{Fe}(s)$ reacts with $\text{O}_2(g)$ to produce $\text{Fe}_2\text{O}_3(s)$.

0.626 mol Fe was reacted with 19.20 g O_2 to produce Fe_2O_3 .

- (i) Calculate the theoretical yield of $\text{Fe}_2\text{O}_3(\text{s})$.
- (ii) When the reaction is complete (finished), what mass of Fe remains unreacted?
- (iii) When the reaction is complete (finished), how many moles of O_2 remain unreacted?